

AMENDMENTS TO THE DRAWINGS

The attached sheet of drawings includes changes to Fig. 1 replaces the original sheet including Fig. 1.

Attachment: Replacement Sheet

REMARKS

Reconsideration and allowance are requested.

The replacement sheet of drawings shows the bridge on the primary side of the transformer as requested by the Examiner. Support for the changes to Figure 1 may be found for example at page 4, lines 7-11 and lines 25-29. Thus, no new matter has been added. Approval and withdrawal of the drawing objection is requested.

Claims 1-6 stand rejected for obviousness under 35 U.S.C. §103 based on Greenfeld. This rejection is respectfully traversed.

Claim 1 now incorporates the subject matter of claim 2, and claim 4 the subject matter of claim 5. Both claims 1 and 4 also recite that the switches on the primary side are turned off for longer periods of time than they are switched on. Example support for this amendment is found on page 6, lines 6-8 and lines 19-21.

Greenfeld describes a DC-DC power converter with a symmetrical half-bridge converter 12 including a transformer having a primary winding P1 and first and second secondary windings S1 and S2, respectively. There are two switches Q1 and Q2 on the primary side, and two switches Q3 and Q4 on the secondary side. The half bridge feeds to “buck converters” 14 and 16. In Figure 6, the half bridge converter 12 is replaced with a full bridge converter 18 that includes two additional switches Q1B and Q2B on the primary side so that there are now two switch pairs on the primary side. The Sun patent also referenced by the Examiner as being relevant is quite similar to Greenfeld.

The Examiner considers switches Q3, Q5 and Q4, Q7 of Figure 6 in Greenfeld to be the claimed switch pairs on the secondary side. Applicant disagrees. Claims 1 and 4 recite “a secondary side bridge on the secondary side of the transformer including a first pair of switches

and a second pair of switches.” Grennfeld lacks the claimed bridge coupling on the secondary side. Only switches Q3 and Q4 are disclosed by Greenfeld as being part of the converter, and they do not form a bridge on the secondary side. Nor can Q3 and Q4 be both the first and second pairs of switches on the secondary side.

Greenfeld also lacks “means for linking on/off-switching of the first pair of switches on the primary side to the on/off-switching of the first pair of switches on the secondary side by switching off the first pair on the secondary side when the first pair on the primary side is switched on, and when the first pair on the primary side is switched off, switching on the first pair on the secondary side, and means for linking the on/off- switching of the second pair (of switches on the primary side to on/off- switching of the second pair of switches on the secondary side by switching off the second pair on the secondary side when the second pair on the primary side is switched on, and conversely, when the second pair on the primary side is switched off” (quoted from claim 4).

The Examiner calls Q3 and Q5 a first pair of switches on the secondary side and Q4 and Q7 a second pair of switches on the secondary side. Again, these alleged “pairs” are not part of a secondary bridge coupling. Moreover, the claimed linkage between these alleged pairs is missing. In [0029], Greenfeld explains: “The ON time for the switch Q5 may be regulated independently of the switches Q1 and Q3 to achieve the desired output voltage V_{out} ,” and in [0032], “The switches Q5-Q8 may be controlled by a control circuit (not shown), as is known in the art. In addition, the duty cycles of switches Q5-Q8 may be modulated by the control circuit, as known in the art, based on the output voltage (V_{out}).” Clearly, if Q5 may be regulated independently of the switches Q1 and Q3, then Q5 and Q3 are not the claimed pairs since each switch in a pair in the claims is switched on and off together for the same amount of time. The

same is true of Greenfeld's switches Q7 and Q4. The fact that switches Q5-Q8 may be controlled separately also demonstrates that the switching of the switch pairs on the primary side in Greenfeld's Figure 6 is not linked to switching of any switch pairs on the secondary side.


The technology in this case is directed to a very different problem than the problems Greenfeld and Sun are addressing. Greenfeld hopes to provide a high efficiency converter with zero voltage switching to maintain high efficiency regulation of the output voltage. Sun hopes to limit the effects of reverse current in a synchronous rectifier. In contrast, the claims are directed to a "freewheeling" cycle, which is the period of time when neither of the switch pairs on the primary side is on. During the "freewheeling" cycle, there is energy left in the system which needs to go somewhere. Without the claimed technology, this leads to a current passing through the transformer windings, resulting in losses and corresponding heat build-up. The claimed technology solves this problem by ensuring that at least one pair of switches on the secondary side is always on.

The application is in condition for allowance. An early notice to that effect is respectfully requested.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____


John R. Lastova
Reg. No. 33,149

JRL:maa
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100